The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Scope for the Average Scientist

FUEL is a subject which touches nearly every industry and although it may not in itself be directly a "branch" of the chemical industry, nevertheless it is a subject for the chemist and the chemical engineer. Accordingly, when the President of the Institute of Fuel speaks of matters of interest to chemists he may be supposed to speak with some measure of inside knowledge. Mr. W. M. Selvey, in his Presidential Address this month, raised some topics of considerable interest, although he modestly disclaimed any claim to special ability, but preferred to regard himself as one of the "hundred thousand who have in their earliest formative period absorbed the scientific outlook."

As a member of the rank and file, Mr. Selvey, himself an electrical engineer, is disquieted at the hard lot of teachers of scientific subjects and their divorcement from research. The number of the teachers in scientific subjects is regarded as satisfactory, but Mr. Selvey is not satisfied with the conditions under which they work. "Years back," he says, "when things were on a small scale, many of them had little private laboratories and were able to do minor forms of research as a side-line. As the years went on, however, research in pure science became a matter for the Bishops and Deans of Science working at a very few Universities with heavy and costly apparatus. Not only are they, the vicars and curates, thus excluded from this field, but even its literature is becoming difficult to get and difficult to read."

Pure research, it cannot be denied, is becoming more intricate. The fashions in research are in directions which need large and expensive laboratory facilities. It becomes difficult for the private individual in a school or technical laboratory to conceive of work he might engage upon with advantage. To those who feel discouraged by the fearful mathematical complexity of modern research in pure science, we suggest that there are many lines of research—minor forms of research perhaps—in which they can work without the elaborate paraphernalia of the atom-smasher. If they have not the vision to perceive experimental problems for themselves—and it is not given to everyone to do this—they should approach local industrialists who could probably start them off on half-a-dozen problems. They will not necessarily solve those problems, but from that starting point they will be led to work that may ultimately prove of considerable value. Let it not be forgotten either that in normal times grants can be obtained from various sources, including the D.S.I.R., towards the purchase of apparatus for approved research.

It is not, of course, by any means certain that there exists this mass of qualified men anxious and able to undertake research. But if it does exist could it not be turned to more useful purpose by some of the research associations working under the D.S.I.R.? Mr. Selvey, after describing what the country is doing in the way of research, unconsciously gives us a lead. He says: "There is one aspect of research which has, I think, escaped this country—what I call the 'mass attack.' This idea was, I think, first developed by the Badische Anilin und Soda Fabrik on the dye question, but it was also a fundamental idea of Edison's. If you have a number of independent investigators on a specific problem they may all fail, though one may be lucky. If you put 1000 on it you are almost bound to get, if not the actual solution, something often still more valuable, a way round it, and a number of new starting points. A striking recent example of this was the attack by Smith, of Milwaukee, in the States, on the welding of boiler drums, of which I suppose the general public knows very little. I do not see how this method can be adapted to our still highly individualist make-up, but it is a method which calls for earnest consideration in the great problems which face us in the future."

Another point of interest is the extent to which technical bodies should engage in politics. Mr. Selvey agrees that there must be reluctance to do so directly. "This reluctance—to put it no higher—to couple any institution's affairs with politics is, I think, something fundamental. In my view, it is based on the political method of appeal to 'emotion' to settle passing problems, a short cut by which ignorance is disguised as expediency. Emotion is utterly foreign to the scientific spirit, with its critical examination of problems." Nevertheless, Mr. Selvey is evidently aware of the need for giving scientific advice to any government or political party which honestly seeks for the truth, and he considers that science must make its voice heard. He refers with approval to the activities of the Parliamentary and Scientific Committee, which he thinks may be the germ of a movement capable not only of bringing the average scientific view before those who may wish to profit by it, but even of uniting the various institutions on a common board for concerted action—not so easy a matter as it may seem. The Government of the day, no doubt, frequently calls for advice and help from outstanding scientists on particular matters, but that is too often connected with capitalising the reputation such men already enjoy with the general public. Finally, Mr. Selvey hopes that the movement to erect a building large enough to house all the principal groups will be resurrected after the war as an aid towards taking common action when desirable.

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NOTES AND COMMENTS

A Milestone of Chemical Publishing

THE appearance of another volume of "Thorpe" in the revised and enlarged form (reviewed elsewhere in these pages) is in itself an admirable comment on the continuity of the chemical industry and of scientific research, not to mention the indomitable tenacity of the publishing trade, which has fully co-operated with men of science in maintaining the flow of essential print in sufficient quantity to satisfy the ever-growing desire of the public, both lay and professional, for accurate scientific information. Some idea of the difficulty involved in the present instance may be derived from the fact that the publishers describe themselves as "of Paternoster Row," whereas the book is actually published from an address in the South-Western suburbs. The publishing trade as a whole, with its highly inflammable stocks, suffered severely in last winter's incendiary attacks on London. It is about sixteen months since the previous volume of "Thorpe" appeared, on the very day when its principal and eponymous editor died. Dr. Whiteley has continued the task undaunted, though with the modesty of a true scientist, he acknowledges on the title-page that he was "assisted by eminent contributors," and in a brief foreword explains that the work on this present volume was so far advanced at Thorpe's death that its production presented no insuperable difficulties. An interesting point is that certain subjects that would normally have appeared in this volume will be treated later, owing to the war activities of some of the contributors. Modified titles will be used, of course, to preserve the alphabetic scheme; but the cross-referencing of "Thorpe" has always been one of its strong points, and we await the completion of this edition with interest.

Production and Wages

THE need for maximum production is universally admitted, especially now that Russia requires our material support, and we welcome the campaign lately begun in the *Financial News* for increasing the nation's output of armaments. In an important article attention is drawn to Mr. Bevin's repeated warnings against the fallacy that long working hours raise output. They do not; and it is the policy of the Government in the state factories to restrict the length of the shifts wherever possible. It is the influx of women workers into the munition factories that has raised the problem again. Women in Government engineering establishments as a rule work six eight-hour shifts a week, but this they supplement by overtime in order to raise their wages. Here, in fact, is the source of the evil—the discrepancy between men's and women's wages, which, since women are now an integral part of industry, deserves to be fully investigated for its effect on health and absenteeism. The *Financial News* publishes a table of the average weekly earnings of men and women in some of the main industries in July, 1940. In general engineering men were getting 97s. 11d.; women 47s. 7d.; in electrical engineering the rates were 106s. 6d. and 47s. 6d.; in motor, cycle, and aircraft work the figures were 114s. 11d. and 50s. 2d.; the difference in pay continues through other industries. Since these figures were issued the discrepancy has varied only slightly and in order to increase their weekly earnings many women have felt obliged to work long hours of overtime, with consequent over-exertion leading to ill-health, absenteeism, and a fall in production. There would therefore seem to be much justification in the claim of the *Financial News* that "an adequate level of remuneration for women in the war industries would do more than any other single thing to stimulate recruiting (for industry), keep women in wartime jobs, and raise productivity per head." In short, if a woman is replacing a man in a works there is a strong case for reducing the disparity of wage-rates. In replacing a man she has fulfilled her primary task and it is only right that her pay should be brought into line, thus abolishing the inducement to work long hours under war-time conditions which are often specially detrimental to health.

Pooling Secrets

THE Association of Scientific Workers, pursuing their claim that the scientific and technical ability of the nation has not been properly utilised, is asking for an inquiry in both industry and Government departments into the "inadequacies in production." Furthermore, the Association calls for more intelligent utilisation of the Central Register and a survey of the existing groups of scientific workers and engineers and of persons with scientific or technical ability, outside the groups to be transferred to work of national importance. It also suggests that all information relating to war equipment, whether data on research work, design, or production experience, should be made available to all concerned, and not retained by one firm as trade secrets As an industry that of chemistry suffers particularly from "trade secrets." Labour-saving dodges, safety measures, simplified processes, new methods, if they could be shared among partners in the chemical industry as a whole, might well contribute to the speedier winning of the war. Certainly, "all information relating to war equipment" should be exchanged under an agreement whereby such knowledge after the war cannot be exploited by those who have received it from firms acting for the good of the common cause.

Vitamins and the Public

CLASSES of chemical compounds occasionally catch the public eye or ear, skilfully aided by the often uninformed explanations of the popular Press. A gallant attempt, for example, has been made to popularise the sulphonamide derivatives, but their names, perhaps fortunately, are too difficult for the non-chemical tongue to master with the necessary absence of effort. Casimir Funk, however, did a great service to the pseudo-scientific Press and to the cause of dubious publicity when he coined the term vitamin, or, as he spelt it "vitamine," in 1911 for what he considered to be an "amine essential to vitality." For their own convenience, scientists have continued to use this simple name, with various letters and numbers as appendages, for the "accessory food factors" which Gowland Hopkins showed to be essential to healthy animal life. Chemists in general are apt to be asked questions concerning these factors, which are admittedly of importance to human beings, and as the chemistry of the vitamins is a fairly complicated matter, many will be grateful for the publication of a brief but scientific survey of the present position, such as Mr. E. H. T. Jukes provides in the September issue of the *Journal of the Institute of Brewing*. It is well worth reading, as it is to the interest of every chemist to help dispel the vague idea, fostered by the inaccurate use of the word by certain advertisers, that vitamins are "little bodies found in vegetables and herbs"!

SYMPOSIUM ON UNIT PROCESSES

Meeting of the American Chemical Society

AT the meeting of the Division of Industrial and Engineering Chemistry of the American Chemical Society held at Atlantic City, New Jersey, on September 8 to 12, the first day was given over to various papers which fell under the general heading of a "Symposium on Unit Processes." Through the courtesy of the Society we are able to publish abstracts of a selection of these and others.

"Oxalic Acid from Sawdust" was the subject chosen by D. F. Othmer, of the Polytechnic Institute of Brooklyn, who dealt with it in three papers: "Optimum Conditions for Manufacture" in co-operation with C. Gamer and J. J. Jacobs; "Continuous Manufacture," with Jacobs and A. A. Pabst; and "Recovery of Products Resulting from the Treatment of Wood with Caustic," with R. H. Royer. The first paper begins by saying that the fusion of caustic soda with sawdust to produce salts of oxalic and acetic acids is not a new process, having for years been the commercial source of oxalic acid. Current prices and demand for these acids make interesting a study of this method. The fusion operation has therefore been studied from the standpoint of more efficient recovery of by-products, as well as an increase of yield by accurate control of the process variables. The optimum values of the variables investigated were: ratio of NaOH to sawdust, 3:1; concentration of NaOH used, 50 per cent.; time of fusion, 3 hours; temperature of fusion, 220° C.; depth of fusion mass, as shallow as possible; type of wood, dependent on cellulose content.

High Yield of Oxalic Acid

Carrying out the fusion in thin layers, or blowing of air over the mass, gave increased yields of oxalic acid. Runs made on six types of wood showed that the yield of oxalic acid was dependent on the cellulose content, although these yields were always higher, by a constant percentage, than the theoretical yield based on the results of fusion with pure cellulose. Since NaOH is the most expensive raw material used, its efficient recovery is a requisite of the successful operation of the process. Recycle runs showed the necessity for a 14 per cent. make-up of NaOH. However, a careful material balance indicated that it should be possible to reduce this to 3 per cent. make-up. Methyl alcohol and formic acid are produced in quantities large enough to warrant their separation and recovery.

Fusion of Sawdust with NaOH

The second paper described the fusion trough designed in order to carry out the fusion of sawdust with caustic soda continuously. The apparatus was constructed of sheet steel and consisted of a trough 20 ft. long, 7 in. wide, and 8 in. deep. Forward motion of the fusion mass was obtained by the use of forty 0.25 in. vanes bolted, at an angle to form a continuous helix, to a 2 in. drive shaft. The shaft was driven by a 2 h.p. motor through a worm gear speed reducer and chain sprocket drive, set to turn the shaft at approximately 6 r.p.m. The apparatus was gas-heated. The fusion mass was a mixture of sodium hydroxide, sodium carbonate, sodium oxalate, sodium formate, sodium acetate, and humus, and to make complete material balances a method of analysis was developed for this complicated mixture. It was found that under continuous operation, the amount of caustic used could be decreased from that found necessary in the previous investigation, and that higher yields of oxalic and acetic acid were obtained in continuous operation than in batch runs. Definite colour changes were noted in the mass as fusion progressed, these being a direct indication of the yield of oxalic acid. The presence of wood fatty acids in the mass was shown. A method of separating the salts was to leach the fusion mass with water, evaporate to 38°Bé, and precipitate out most of the oxalate, acetate, and formate. After centrifuging, the liquor (containing all the free caustic and some sodium acetate) could be evaporated and recycled. The filter cake was treated with milk of lime and the calcium salts of the acids were precipitated for a further separation.

The caustic fusion produces volatile constituents such as methanol, and non-condensable gases such as CO_2, CO, N_2, and O_2, in addition to the fusion cake containing humus materials, sodium oxalate, sodium acetate, sodium formate, sodium carbonate, and considerable excess sodium hydroxide. A separation process for the five sodium compounds from aqueous solution which would be applicable to manufacturing operations was the first consideration; and this complex system was first studied. Of the available methods which might be used, fractional crystallisation and precipitation, after evaporating to the correct concentration, were used to give preliminary separation of the oxalate, of the acetate and formate together, and of the carbonate and caustic. Double decomposition with lime gave calcium salts of the acids, as more economical for treatment with sulphuric acid for recovery of acids; and this treatment also recausticised the carbonate for re-use. The separation of the constituents of the actual cake, made as previously described, was hampered by the presence of the humus materials. One method found to be of help was the use of activated carbon as a preliminary treatment to the obtaining of the crystallisable salts.

Chlorination of Metal Oxides

H. F. Johnstone and R. W. Darbyshire, University of Illinois, presented a paper on the "Chlorination of Metal Oxides with Sodium Chloride and Sulphur Dioxide." The present study was made to determine whether these reactions might serve as possible outlets for large quantities of sulphur dioxide recovered from waste gases. The use of such cheap and abundant raw materials for the production of salt cake, hydrogen chloride, chlorine, and anhydrous metal chlorides and sulphates is of interest to the heavy chemical industry. The reactions were studied between 300° and 700° C. In the absence of moisture, the products are gaseous chlorine and a residue containing metal chlorides and sulphates. Of the oxide ores studied, hæmatite, bauxite, chromite, and melanconite are the most reactive. Pyrolusite, zircon, and ilmenite are next in reactivity, pyrolusite being the poorest in the formation of chlorine. Rutile and beryl are the least reactive of the ores studied, as far as the formation of sulphates or chlorides is concerned, but they act as catalysts for the formation of chlorine. The mechanism of the reaction with ferric oxide indicates that the initial reaction is the formation of a compound between the oxide and sulphur trioxide, either of the valence type or an adsorption complex, which reacts with the sodium chloride at the point of contact. Within the range of conditions studied, the reaction is negligible when the two solids are not in close contact. Among the products of the reaction are chlorine and sulphur dioxide, which readily attack iron oxide. The vapour pressure of ferric chloride over molten solutions containing sodium chloride is very low, so that volatilisation from such mixtures is prevented.

Continuous Wood Hydrolysis

A continuous process for the hydrolysis of wood and other plant fibres with dilute acid has been developed, which results in the production of lignin and lignocellulose for plastics, as well as acetic and formic acids, furfural, and wood sugars. This process, described in "Wood Hydrolysis: A Continuous Process" by Katzen and Othmer, Polytechnic Institute, Brooklyn, eliminates to a great extent the major problems encountered in batch processes and it is applicable to wood wastes in the form of wood flour, sawdust, or small chips. These materials are suspended in a quantity of dilute acid, such as sulphuric, sufficient to permit a free-flowing suspension. The suspension is pumped continuously under pressure into a

double pipe heat interchanger in which preheating, hydrolysis, and cooling occur. The hydrolysed suspension is then discharged by means of an electrically operated release valve to a receiver at atmospheric pressure. The further steps of filtration, washing, drying, and grinding follow standard practice. In the continuous process, the degree of hydrolysis can be controlled so as to yield a ligneous product containing anywhere from nearly all the cellulose present in the original wood to practically no cellulose. The major factors governing the degree of hydrolysis are: pressure, temperature, acid concentration (or *p*H), and time. As the continuous process is dependent upon the maintenance of a completely hydraulic or liquid system at all times, pressure and temperature may be varied independently; thus subsequent observation of the individual effects of these variables on the process is possible. The hydrolysis liquors which contain acetic and formic acid, furfural, and wood sugars, in addition to the acid originally used, may be recycled for re-use in hydrolysis. In this way by-product concentrations may be built up. Or, if subjected to rehydrolysis, some of the sugars break down to give additional yields of organic acids and furfural. These by-products are obtained in high yields and are readily and economically recovered by extraction and distillation. Major advantages of the continuous process include accelerated hydrolysis (1 to 10 minutes as compared with 30 minutes to 6 hours for batch processes), due chiefly to improved heat transfer; better control of the operating variables (resulting in more uniform products and permitting accurate duplication of results); low steam costs due to heat interchange and elimination of blowdown; and low equipment and operating costs due to simplicity of equipment and reduction in handling of materials, labour, and supervision.

Continuous Benzine Nitration

"Nitration of Benzene: Continuous Process, Using HNO_3 Alone" was dealt with by Othmer, J. F. Levy and Jacobs. Nitration of benzene has been accomplished without the use of sulphuric acid, or other dehydrating agent, and the water of nitration is removed as an azeotropic mixture with benzene. This mixture boils at 69.25° C. The effect of acid concentration upon the rate of nitration was studied, with and without agitation of the benzene and aqueous acid layers. The effect of time upon the percentage of conversion, using 68 per cent. HNO_3, was also determined. In the preliminary runs, the water and benzene removed as an azeotropic mixture contained considerable quantities of acid. Additional length of the distilling column reduced this acid; but the possibility of a ternery system was considered. An investigation of the system benzene-acid-water showed that 68 per cent. nitric acid could be fractionated from the benzene-water azeotrope. Further investigations were carried out with a feed of constant boiling nitric acid vapour. The data necessary for the design of a two-column continuous system were obtained, which may be operated smoothly owing to the large excess of benzene always present.

Nitromethane and Chloromethanes

Thomas Boyd and H. B. Hass, of Purdue University, Lafayette, Ind., describe how they studied the nitration of methane with 67 per cent. nitric acid, using a range of contact times and temperatures. The methane was obtained from the laboratory supply line and, after purification and storage under pressure, was led to the reaction chamber through a preheating coil. The nitric acid was then introduced as a vapour formed from the constant boiling mixutre (67 per cent. HNO_3). The study was conducted by maintaining a constant contact time and then determining the percentage conversion of nitric acid to nitromethane for a series of temperatures.

E. T. McBee, H. B. Hass, and C. M. Neher, Purdue University, presented a paper in which it was stated that both the abundance of methane and the comparative cheapness of chlorine favour the industrial utilisation of chlorination for the preparation of the chloromethanes. In most recorded processes it was necessary to use some economically undesirable feature to avoid an explosive or burning reaction when high concentrations of chlorine were employed. The Hass-McBee chlorination technique consists in passing a hydrocarbon through a reactor while chlorine is introduced through jets suitably spaced along the reactor. By such an arrangement the momentary concentrations of chlorine are maintained below those which yield explosive mixtures, and the overall mole ratio of reactants may be any desired value—for example, four of chlorine to one of methane to produce carbon tetrachloride. Graphs of temperature gradients were helpful in selecting the most suitable bath temperature, spacings of chlorine jets, space velocity, etc. Most of the data were obtained at 440° C. The ratios of the four chloromethanes in the product can be varied from nearly 100 per cent. methyl chloride to exclusively carbon tetrachloride.

Saponification of Fats

The basic process of saponification of fats at high temperature in the presence of kerosene, as disclosed by Kokatnur, was investigated by J. J. Jacobs, and several of the operating difficulties, such as the necessity for washing with solvents and discoloration of the soap, eliminated. The process is carried out in the laboratory as follows: tallow or any other suitable fat is dissolved in kerosene and heated to 180° C. in an agitated flash. Powdered anhydrous caustic is added and the temperature brought to 220° C. Saponification is completed in the laboratory equipment in less than 15 minutes. It has been shown that the use of crystalline anhydrous caustic will cause the saponification to be complete in less than eight minutes. After complete saponification, the flask will contain a gel of soap in kerosene (which is liquid above 180° C.) and glycerol in suspension. This liquid is then sprayed into a vacuum flask (1 to 10 mm. of mercury) through a glass spray nozzle. In the vacuum flask, the kerosene and glycerol flash off together, leaving behind a finely divided powdered soap. Since kerosene and glycerol are immiscible, they will flash off at a temperature lower than the boiling point of either. After condensation, the kerosene can be decanted from the glycerol and recycled. Since the system is essentially anhydrous, the glycerol recovered will contain 1 to 6 per cent. water, depending upon the fatty acid content of the tallow, and is only slightly off colour. The highest recovery obtained in the laboratory to date has been 86 per cent. Since the unrecovered glycerol is present in the soap, proper design of spray nozzle and adjustment of feed rates, etc., will probably increase this yield. The minimum residual kerosene on the soap, using fresh kerosene, was found to be less than 0.4 per cent. This can be reduced to a trace by recycling the kerosene and consequently eliminating the high boilers. It was found that the odour of kerosene, in most cases, was noticeably absent. This is probably due to the deodorising effect of caustic and soap on kerosene at high temperatures. A small pilot unit has been built to study the effects of design of the spray nozzle and other factors on recovery. The process is applicable to continuous operation.

"Studies in Esterification: Preparation and Properties of Starch Propionate" were described by D. E. Mack and R. N. Shreve, of Purdue University. The propionic ester of starch can be prepared by refluxing propionic acid and anhydride with starch. Both react, the acid being about 8.7 times as fast as the anhydride. The finished material, a light brown, non-hygroscopic powder, is insoluble in water, soluble in many organic solvents, and can be used to give protective coatings to cloth, paper, wood, metal, and the like. The coatings are not affected by water, dilute acid or alkali, alcohol, or mineral oils.

Mercuration of Benzene

Previous work on the direct mercuration of benzene has produced considerable amounts of polymercurated benzene. K. A. Kobe and P. F. Lueth, jr., of the Department of Chemical Engineering, University of Washington, Seattle, Wash., give details in "The Monomercuration of Benzene," of a new method where an acetic acid solution of mercuric acetate, added slowly to a solution of benzene and acetic acid in an autoclave at 110° C., gives a monomercurated product alone. Optimum conditions were deter-

mined for the ratio of acetic acid to mercuric oxide and benzene to mercuric oxide, and the solubility of mercuric acetate in glacial acetic acid determined.

General Papers

On the Thursday afternoon general papers were read. Among these an account of "Further Studies on the Decomposition of Barium and Strontium Sulphates in Aqueous Solutions" was delivered by R. Norris Shreve and H. F. Wiegandt, Purdue University, Lafayette, Ind. The decomposition of these sulphates by the action of strong solutions of calcium chloride is found to result in the formation of the soluble modification of anhydrite ($CaSO_4$). Dilution of the reaction mass at this point with water results in immediate reversion to the initially reacting materials. The soluble anhydrite is converted to the much less reactive insoluble modification by heating the reaction products at high temperatures. This makes practical the use of aqueous methanol as an extraction solvent for the recovery of the barium chloride made. In these circumstances even water alone will extract most of the barium chloride initially formed before the insoluble anhydrite has had time to react. The effect of aqueous extractions on decompositions carried out by fusing the reactants also gives similar results.

Preparation of Starch Acetates

Charles A. Burkhard with E. F. Degering, also of Purdue University, prepared starch acetates at 0° to 50° C. in 10° C. intervals using 145 ml. of acetic acid, 125 ml. of acetic anhydride, and 25 grams of dried starch. A more rapid rate of acetylation was observed using this mixture than that with only acetic acid or acetic anhydride. Sulphuric acid was added in amounts of 1, 2, 3, 4, 5, 7·5, and 10 per cent. as a catalyst and it was noted that more rapid acetylation and degradation resulted when higher concentrations of sulphuric acid and higher temperatures were used. The preparation of starch acetates at the reflux temperature of acetic acid with only a small amount of acetic anhydride was studied. Very rapid acetylation was found to occur after an induction period, which was followed by a diminished rate after an acetyl value of 35 per cent. had been attained. After 40 hours starch triacetate was obtained. Sulphuric acid, *p*-toluene sulphonic acid, zinc chloride, and sodium acetate had a catalytic effect on the acetylation. Some degradation was observed with the sulphuric acid and *p*-toluene sulphonic acid. Ketene was used to acetylate starch in both liquid-gas and solid-gas phase reactions. Modification of the starch took place.

"Drying of Heat-Sensitive Substances: A Modified Flash Drying System" was the subject chosen by W. C. Rongsted, J. B. Gottfried, and L. C. Swallen, Corn Products Refining Company, Argo, Ill. They describe a drying system applicable to substances which tend to form when wet an unworkable mass of dough or liquid at slightly elevated temperatures, but which act as solids at temperatures attainable by moderate refrigeration. Particular application is made to the preparation of zein. The system consists of a modified two-stage flash drying system, in which a partially dried product (15 per cent. moisture) is cooled by refrigerated air, mixed with specially dispersed raw filter cake, dispersed in a hammer mill, and dried in a hot air stream which does not pass through the mill. Intensive drying is avoided, so that incompletely dried particles will not be overheated (resulting in partial fusion). Final drying is accomplished in a secondary hot air system through which the recirculated portion of the material does not pass.

Naphthenates

LeRoy S. Wetherby and H. Schiller, University of Southern California, prepared and determined the properties of three esters of a certain fraction of naphthenic acids; also the rate of esterification with and without catalyst. The naphthenic acids obtained from petroleum refining had an acid number of 302 and apparent mol. wt. of 186. In ester preparation 1000 g. acid, 50 per cent. excess alcohol, and 100 c.c. conc. sulphuric acid were used, refluxing for three hours. Distillation gave initial and end-point temperatures: methyl ester, 171° to 282° C. ethyl ester, 185° to 285° C.; isopropyl ester, 199° to 175° C. The rate of esterification of each ester under refluxing conditions, using 31 g. acids and 50 per cent. excess alcohol with and without 1 c.c. sulphuric acid, was determined by withdrawing portions at intervals of ¼, ½, 1, 2, and 3 hours, and recovering and titrating the unreacted naphthenic acids. Reaction curves were established showing the reaction with catalyst to have reached practical completion in under three hours and at about 85 per cent. esterification, whereas those with catalyst in the same time esterified only about 6 per cent.

A. W. Hixson and A. H. Tenney, Columbia University, in a paper entitled "Chlorine and Salt Cake from Salt and Sulphur," mentioned the increased demand for chlorine and salt cake and emphasised the need for new sources of these materials. Anhydrous reaction of SO_3 on NaCl offers a possible means of producing Na_2SO_4 and Cl_2 simultaneously from cheap chemicals. Previous work on the reactions involved is inadequate and a new laboratory method for their study has been developed. The chemistry of a portion of the process may be elucidated as follows:—

1. NaCl and gaseous SO_3 react, forming addition compounds of one, two and perhaps three moles of SO_3 per mole of NaCl. This reaction is impeded by crust formation.

2. The higher addition compounds are unstable at room temperature. Above 115° C., $NaCl.2SO_3$, decomposes to SO_3 and $NaSO_3Cl$.

3. Between 225° and 300° C., three moles of sodium chlorosulphonate liberate one mole each of Cl_2 and SO_2.

4. The solid residue of this reaction is empirically an equimolar mixture of $Na_2S_2O_7$, and NaCl which react forming Na_2SO_4, Cl_2, and SO_2 above 330° C.

The reaction kinetics of 3 and 4 have been investigated and reaction orders and rate constants determined at several temperatures. Comparison of a possible process using these reactions with older processes for chlorine and salt cake has been made.

Vitamin B_2 Synthesis

Higher Yield of Intermediate Product

IN the synthesis of riboflavin, the preparation of 3,4-dimethylaniline is an important step. W. A. Wisansky and S. Ansbacher, of the International Vitamin Corporation, New York, have obtained this xylidine without resorting to the methods of Karrer or James and others, which comprised nitration of *o*-xylene, isolation by repeated fractionation of the 4-nitro-*o*-xylene, and subsequent catalytic hydrogenation of the latter compound. These methods were found to be laborious and to produce low yields (15-27 per cent.).

The authors have found (*J. Am. Chem. Soc.*, 1941, *63*, 9, 2532) that 4-bromo-*o*-xylene, obtained from pure *o*-xylene by bromination and subsequent vacuum distillation in 85 per cent. yield, may be transformed to 3,4-dimethylaniline, when subjected to high pressure ammonolysis for the conversion of aromatic halides to the corresponding amines. The finally resulting 1,2-dimethyl-4-aminobenzene was found to be practically free of isomers.

In a bomb of a high-pressure hydrogenator, 200 g. of 4-bromo-*o*-xylene, 14 g. of copper wire, and 600 ml. of 28-29 per cent. ammonia containing 12 g. of cuprous chloride were placed and agitated at 195°C. and 900-1000 lb. pressure for 14 hours. After cooling, the two layers were separated and 40 ml. of 40 per cent. alkali was added to the organic layer. The product was steam-distilled and the crude xylidine, which crystallised on cooling, was further purified by dissolving it in 500 ml. of 8 per cent. hydrochloric acid and extracting the acid solution twice with 100-ml. portions of ether. The acid solution was made alkaline and steam-distilled; the distillate was cooled and filtered; and the resultant dry product purified by vacuum distillation at 116-118° C. and 22-25 mm. The yield was 103 g. of 3,4-dimethylaniline (79 per cent.).

Anodic Oxidation of Lead

Suggested Investigation Method

OXIDATION of lead to PbO_2 and reduction of the dioxide to lead are the fundamental reactions of the accumulator. E. Krivolapova and B. Kabanov (*J. Phys. Chem. Russ.*, 1940, *14*, 279) suggest the following method of their investigation. A smooth lead electrode is polarised anodically in 7*N* sulphuric acid for 24 hours, using a current density of 0.2 milliamp. per sq. cm. Then it is made a cathode and depolarised in a mixture of 1*N* sodium sulphate and some sulphuric acid using a current of 20 milliamp. per sq. cm. The potential of the cathode is continuously or very often recorded. If the potential is plotted against time on the curve two standstills are observed corresponding to the processes $PbO_2 \rightarrow PbSO_4$ and $PbSO_4 \rightarrow Pb$. In some solutions, however, a third horizontal part occurs (at −0.18 volt relatively to the normal hydrogen electrode) which presumably is due to the decomposition of a compound between PbO_2 and $PbSO_4$. The existence of this compound would account for the impossibility of utilising more than 50 per cent. of the lead peroxide in the positive plate. Anodic oxidation of lead is stopped by HCl in the solution. The corrosion of lead is intensified by 0.1 per cent. HCl and by organic acids (acetic, palmitic, stearic, etc.) A valuable effect is produced by cobalt sulphate. When sulphuric acid contains 0.1 per cent. of $CoSO_4$, the corrosion of lead plates is lowered by 50 per cent., the life of the plates is prolonged, and the charging voltage reduced by 0.15 to 0.20 volts.

LETTER TO THE EDITOR

Recovery of Used Lubricating Oil

SIR,—I have read with much interest and appreciation Mr. J. E. Walker's article on the recovery of used lubricating oil, which appeared in THE CHEMICAL AGE on September 30 and October 4.

During the past few years we have treated many varieties of lubricating oil stocks, including a number of used crankcase oils, and, since the outbreak of war, the recovery of used lubricating oil has occupied a great deal of our attention. In this connection many samples of this material, from various sources, have been examined by us with a view to regeneration.

Among the processes employed by us, we have successfully operated on a large scale those described by Mr. Walker under Nos. (4) and (6) with small, but notable differences in method. We confirm that No. 6, *viz.*, the acid, clay, and steam treatment, is economically the most efficient and gives a high grade product. But it is highly important that the oil, before acid treatment, should be processed to eliminate suspended and colloidal matter, moisture and diluents. One obvious reason for this pretreatment is that only the lubricating oil stock should be chemically treated, and not the extraneous material, which may be present to the extent of 20 per cent. or more.

The clay-treating temperature of 250/300° C. mentioned by Mr. Walker is extremely high, and the slight improvement in colour over that of an oil treated at 160/180° C. does not warrant the additional expense and operational difficulty of raising the oil to the higher temperatures. The lower temperatures are quite adequate (with free steam) for removing diluents.

A filtering temperature of 150/200° C. is excessive, as risk of darkening of the finished oil by oxidation, and damage to filter cloths, together with handling difficulties at these temperatures, more than offsets any slight gain in filtering time. Any treated crankcase oil can be filtered quite readily at temperatures of 70/100° C. according to grade, possibly at slightly higher pressures. The viscosity/temperature change of these oils above 100° C. is very small.

Mr. Walker states that treatment by Method (5) quite removes acidity. From our experience we venture to say that it is impossible to forecast the acidity of a treated oil by any of the methods mentioned, as this depends largely on the origin and condition of the used oil. In most cases steps must be taken to neutralise after treatment.

It is possible that the samples treated by Mr. Walker were of good quality or little used. We find that most of the used oil received from Services Depots is in poor condition, containing much water and solid matter in suspension. In some cases it has been impracticable to clear this oil, even by filtering with filter aids, and such a material is fit only for bunker fuel (after raising the flash point, if necessary). The conclusion to be drawn from this is that careful supervision of the draining of sumps and collection of the oil at the depots would greatly facilitate recovery and lower treatment costs.

The cost of producing a good oil may be as much as four times the cost of the chemicals, without taking into account overheads and amortisation of plant, so that the erection of an installation may not prove to be a very attractive proposition. Provision must also be made for the disposal of acid sludge—a serious problem to the small refiner.—Yours faithfully,

L. SOULAL,
Refinery Manager.

October 17, 1941.

Chemicals in Brazil

Local Raw Materials Utilised

SULPHURIC acid, at present the chief chemical product of Brazil, is being produced at the rate of 1 ton daily at a chemical plant owned by the Industria Chimica Iguassu, Ltda., at Bariqui, State of Paranà. The concern has a capital of approximately 875,000 and began operations last January; it is said that all the employees are Brazilian. Other products being produced in increasing quantities are superphosphate, sulphates of magnesium, calcium, sodium, and copper, and sodium chlorate. Investigations are also being made with a view to producing sulphur (from Brazilian pyrites), potassium salts, and about 20 other chemicals. Some of the local raw materials being utilised are manganese, pyrites, limestone, iron, copper, mineral salts, kaolin, nitrate, and various woods.

Sodium sulphate imports, used extensively in Brazil by the glass, soap, and textile industries, according to figures published in *Foreign Commerce Weekly*, declined to 3411 metric tons in 1940, from 7668 tons in 1939, and 5936 in 1938. The decline probably was due to increased manufacture of this commodity in Brazil. In 1938, about 60 per cent. of the imports was supplied by Germany and most of the remainder by Chile. No details of imports by countries are available for 1940.

Iodine Loss Minimised

Industrial Process in Operation

FACTORS responsible for loss of iodine from iodised salt and iodised feeding stuffs have been studied by the Iodine Educational Bureau of the U.S.A. in collaboration with the Mellon Institute for Industrial Research. The work has been designed to evaluate products containing iodine and to investigate technical problems connected with iodisation of certain commercial products.

Iodised salt will lose 40 per cent. of its iodine content during eighteen months' storage, while iodised mineral feeding mixtures may lose between 9 per cent. and 20 per cent. in four months. As a result of work by F. F. Johnson and E. R. Frederick a process has now been evolved which the industry estimates to be particularly valuable. This process, now in practical application, consists in coating 300-mesh potassium iodide with a moisture-proof envelope of magnesium stearate or calcium stearate by a straight milling process using 10 per cent. of the stearates as impalpable powder. The improved product is now in commercial use; it is described as a free-flowing powder, possessing high stability in the presence of salt or mineral oxidising catalysts, and proving capable of complete absorption in the digestive processes.

A CHEMIST'S BOOKSHELF

THORPE'S DICTIONARY OF APPLIED CHEMISTRY, 4th Ed., Vol. V (Fehling's Solution—Glass), edited by (the late) Sir Jocelyn Thorpe and M. A. Whiteley. London: Longmans. Pp. xxiii and 610. 70s. (Also an abridged Index to Vols. I-V. 3s.)

This is the first volume of the standard dictionary of applied chemistry to be produced since the death of the principal editor, Sir Jocelyn Thorpe, but Dr. Whiteley has in no way failed to maintain the standard of excellence set by the earlier volumes, and "Thorpe" remains as indispensable as ever to the industrial chemist.

Needless to say, the familiar and satisfactory system of combining long monographs with short dictionary articles is continued. Textile and fuel chemists will find this volume of particular use, as 97 pages are devoted to the articles on Fibres and Finishing, and 98 pages are occupied by the chemistry of Fuel and of Gas (Coal). The subject "Fibres" is divided into five articles, dealing in detail with Silk, Wool Artificial (or Rayon), Cotton, and other Vegetable Fibres, respectively, by Dr. C. S. Whewell, Professor J. B. Speakman, Mr. J. M. Preston, Dr. A. J. Turner, and Mr. E. J. Hill. Modern developments are fully dealt with, including the polyamide and polyvinyl derivatives, but we should have appreciated, under the heading of Alginates, some mention of the beryllium compound. Messrs. Ellis Clayton and J. M. Schofield deal comprehensively with the Finishing Processes; Dr. G. W. Himus is a recognised authority on Fuel; and the account of Coal Gas is safely left in the hands of Dr. H. Hollings and Mr. E. G. Stewart.

Other important articles deal with Fermentation (Alcoholic, Bacterial, and Mould), Fertilisers, Food Preservation and Preservatives, and Glass, the last running to 70 pages, with the authority of Professor W. E. S. Turner and Mr. M. Parkin of the famous glass technology department at Sheffield.

Such small cavil as we have to make deals with minor points. For example, Ladarello is written for Larderello (the famous natural boric acid source in Italy), on p. 309; the article entitled "Fœnugreek" might well be cross-referenced under the more familiar spelling "Fenugreek"; "Giallolino" requires no accent, and surely the same might be said of sesame (p. 533); in the footnote on p. 520, "pyragyrite" is one of the few genuine misprints we have been able to spot.

The abridged index of cross-references to the first five volumes is a convenience well worth its cost.

Factory Lighting of the Future

Development of the Fluorescent Lamp

DISCUSSING the possibilities of the fluorescent lamp now widely used in industry, Mr. W. J. Jones, M.Sc., M.I.E.E., in the course of his recent presidential address to the Illuminating Society, said that he foresaw a time, not far distant, when 40, 50, and even 100 foot-candles would be a everyday occurrence in the factories of Britain. He went on to say that the United States had led the way in 1938 in the production of fluorescent tube lamps which took the form of 15-watt 18 in. lamps of white and various colours, and the outbreak of war found us ready to embark on a similar development. British manufacturers started by introducing 5 ft. 80-watt fluorescent lamps, which would appear to have been a wise decision, as American practice is now gravitating towards the use of longer lamps.

After the war the field available will be much wider, and modifications of the existing standard lamps, adapted to decorative display and other special purposes, will be available. "The ideal lighting installation," Mr. Jones said "is probably one which permits light to be varied in intensity, a colour change to suit all moods and weathers, and last but not least, the use of a light source which may be moved where it is wanted without hindrance."

The Illuminating Engineering Society has played a leading part in assisting the Ministry of Home Security on lighting problems associated with Civil Defence. Their researches into the visibility of objects viewed from above are being continued and they are prepared with suggestions for the alleviation of the black-out, when the time is considered ripe by the authorities.

East African Natural Resources

Camphor Oil

THE vegetable wealth of East Africa is the subject of the principal articles in the current *Bulletin of the Imperial Institute* (July-Sept., 1941, *39*, 3; price 2s. 6d.). A recent investigation of ocimum oil from Kenya, Nyasaland, and the Seychelles, reveals that the plant *Ocimum kilimandscharicum* is worthy of consideration as a source of camphor at a reasonable price. A ready market could be found for its oil in the United Kingdom, provided that it could be economically produced. The camphor content would have to compete with imported Japanese camphor, which in normal times is valued at 1s. 8d. to 1s. 9d. per lb. Parallel investigations have been going on in the U.S.S.R. on the allied *Ocimum canum* (camphor basil), which grows readily in the Ukraine, Crimea, and Caucasus, and can be acclimatised farther North without serious difficulty. The average yield of camphor from this plant is 20 kg. per hectare, but much higher yields are stated to have been obtained.

Dyeing and Tanning Plants

In an exhaustive and fully-documented article, Mr. P. J. Greenway, botanist at the East African Agricultural Research Station, Amani, deals with local plants that might be of value as sources of dyes and tannins. An alphabetical list of all the available plants is appended. Native mangrove and exotic wattle bark extracts are the only two tannin sources of commercial interest.

Boric Acid Esters

Efficacious Antioxidants

TYPICAL of the way in which boric acid ($B_2O_3,3H_2O$) reacts with aryl aminophenols is its reaction with *p*-hydroxy-diphenylamine resulting in the elimination of water. According to B.P. 509,459 (to U.S. Rubber Products, Inc.), an intimate mixture of approximately equimolecular proportions of the reactants is stirred and heated on a metal bath to 220° C., and held at this temperature until evolution of water ceases. To eliminate the last traces of moisture, the bath temperature is then raised to 300° C., the pressure being lowered at the same time to 3 mm. mercury. The mechanism of the reaction is not fully understood, but it is thought that the first stage may be elimination of water from the boric acid to form meta- or pyroboric acids, which then react with the *p*-hydroxy-diphenylamine. Boric oxide yields the same solid resinous product as boric acid; the latter may, indeed, be regarded as the equivalent of boric oxide plus water of crystallisation.

A list is given of 47 other hydroxy-substituted aromatic secondary amines which yield antioxidant derivatives on exception with boric acid. These inclue 3-amino-4 hydroxy-diphenylamine, N-chlorophenyl-*p*-aminophenol, 4-hydroxy-phenyl-*β*-naphthylamine, phenyl-*p*-hydroxy-benzylamine, hydroxy-naphthyl-anthracylamine, *p*-aminophenol, 2-(tolylamino)-1-hydroxy-naphthalene, 3-ethoxy-4-hydroxy-diphenylamine, etc.

The effectiveness of the boric esters of such amines as antioxidants retarding deterioration in rubber and other oxidisable materials is illustrated by the results of accelerated ageing and flexing tests on a commercial tyre tread compound treated with *p*-hydroxy-diphenylamine derivatives. The proportion of antioxidant used may vary between 0.1 and 5 per cent., this amount being added to the material to be preserved either by milling or mastication, if the material is a solid, or by solution if it is a liquid. (*Paint Techn.*, 1941, *6*, 67, p. 165).

Chemical Matters in Parliament

Nyasaland Bauxite

IN the House of Commons last week, Mr. Creech Jones asked the Under-Secretary of State for the Colonies for the terms of the concessions to the Anglo-American Corporation of South Africa to exploit bauxite in the Mlanje Mountain in Nyasaland

Denying that any concession had yet been granted, Mr. George Hall said that the Corporation held an exclusive prospecting licence over certain areas in the Mlanje district, but were still engaged in exploratory work.

Scientific War Production

Mr. Wootton Davies, referring to the general charges made at the recent conference of the British Association that the fullest use was not being made of scientific methods in our war production, asked the Lord President of the Council whether he would take action to remedy this failure.

Sir J. Anderson, not admitting the inference, assured Mr. Davies that co-operation between Government Departments engaged on all forms of war production was never closer than at present, and was constantly increasing. Further, in order to ensure the fullest possible employment of scientific methods and discoveries in every field of the war effort, the Government, in addition to the pre-war Scientific Departments and the scientific directorates in the Service Departments, had since the war set up two independent committees—the Scientific Advisory Committee and the Engineering Advisory Committee, under the chairmanship of the Paymaster-General, by whom the whole position of the employment of science in the war effort was kept under constant review.

Proteins from Grass

Dr. Edith Summerskill asked the Parliamentary Secretary to the Ministry of Food whether he proposed to use grass as a source of protein.

Replying, Major Lloyd George stated that research work on the production of edible protein from young grass was proceeding. There were, however, considerable technical difficulties is to be overcome before any large-scale production can be contemplated. He added, in answer to a further question, that so far as laboratory tests were concerned, he believed a greyish material, looking like cheese, had been discovered, but that it was purely on an experimental scale.

The Jubilee of an Abrasive

Discovery of Silicon Carbide

GRINDING, as we know it to-day, is not an old art: its development has taken place within 50 years. Wheels cut from sandstone were the principal means of sharpening tools until about 1872 when the first emery wheels made by the vitrified process were placed on the market. The next important step in the improvement of the grinding wheel as a production tool was the creation of the first man-made abrasive, silicon carbide, followed by the development of artificial aluminous abrasives. The *South African Mining and Engineering Journal* recounts how in 1891, Dr. Edward G. Acheson, in the course of some experiments with a crude electric furnace to produce materials of great hardness, succeeded in creating a few tiny crystals of a substance which, although at first unknown, was later found to be silicon carbide—a material that does not occur in nature. The first output of silicon carbide crystals was sold for the purpose of polishing precious stones. Its commercial use in grinding wheels was originally developed by the Carborundum Company. A few years later, a method of artificially reproducing the natural aluminous abrasives, emery and corundum, by fusing bauxite in the electric furnace, was discovered. The manufacture of crystalline aluminium oxide on a commercial scale and its bonding into grinding wheels were developed by the Norton Company. Almost at once the replacement of natural minerals by artificial abrasives began. To-day, approximately 75 per cent. of all of the grinding wheels produced are made with manufactured aluminous abrasives.

The essential raw materials for silicon carbide production are silica sand and carbon in the form of coke. These common inexpensive materials, when subjected to high temperatures in an electric furnace, react with one another to produce the hard and sharp abrasive crystals. The mixture of sand and coke is built up around a carbon electrical conductor and is walled up with uncemented brick. An electric current is then passed through the carbon conductor which generates heat and brings about the reaction between the sand and the coke. A little sawdust is usually added to make the mixture porous and thereby facilitate the escape of inflammable gas given off in the process. At the completion of the furnace run, the product consists of a core of silicon carbide crystals, surrounded by partially or entirely unconverted raw material. The quality is dependent largely upon the choice of raw material and the accuracy of the control and operation of the furnace. A number of companies are employing the process at the present time, and silicon carbide abrasives are sold by them under various trade names.

Aluminium Oxide

Another of the artificial abrasives, aluminium oxide, is made commercially by fusing bauxite at high temperature in an electric arc furnace. Naturally occurring bauxite consists of aluminium oxide (Al_2O_3) combined with water and associated with varying quantities of other impurities. By heating the ore to drive off the combined water before the material goes to the electric furnace, its percentage of aluminium oxide is greatly increased.

The electric furnaces commonly used for the manufacture of aluminous abrasives are of a special water-cooled arc type. The furnace consists of a cylindrical sheet steel shell supported on a carbon base. This shell has no lining. However, during the operation a continuous spray of water is played on it. This chills the layer of material adjoining the shell and forms an effective heat-resistant lining. The intense heat produced in the furnace melts the bauxite ore and permits the reduction of most of the impurities to their metals. These settle through the mass and collect at the bottom of the furnace. During the run, fresh supplies of bauxite are added continually. The finished product is a large " pig " of almost pure crystalline aluminium oxide—extremely hard and uniform in composition.

The chemical composition and the manner of crystallisation have an important bearing upon the abrasive qualities, which can be varied within somewhat wide limits and are controlled to conform to the uses for which the abrasives are to be put. Both aluminium oxide and silicon carbide are modern necessities, not only as mediums of grinding and polishing in manufacturing production, but also as ingredients of other final products. They are basic in grinding wheels, oilstones, sharpening stones, pulpstones, abrasive papers and cloth, nonslip floors and tiles, porous plates, refractories and refractory laboratory ware.

New Cement Standard

B.S.I. Revision Programme Completed

A REVISION of B.S. 146 for Portland-blastfurnace cement has now been issued and this completes the programme of work which has been in hand for the review of the specifications for cement. The essential alterations in B.S. 146 are the modifications to those sections referring to Portland cement and such alterations as were necessary to bring the specification into line with the revision of B.S. 12. As an alternative to the tensile test a compression test may now, at the request of the purchaser, be substituted. Other modifications are the omission of the coarser sieve in the test for fineness of cement, and the deletion of the optional tensile test to neat cement. Copies of this revised Standard may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 3d. post free.

Personal Notes

MR. WILLIAM OWEN BRICKLES, process worker, Manchester, has been awarded the British Empire Medal for gallantry in civil defence.

MR. JOHN BROWN, secretary of the British Iron and steel Trades Association, has resigned from the Industrial and Export Council.

F/O H. ST. JOHN COGHLAN, who was recently awarded the D.F.C., is a director of the Coghlan Iron and Steel Co., Ltd., Hunslet Forge, Leeds, and joint managing director of George Mann and Co., Ltd., colliery owners.

MR. F. H. COTTON, M.Sc., is the new chairman of the London Section of the Institution of the Rubber Industry. MR. GEORGE MARTIN and MR. H. C. BAKER are vice-chairman and hon. secretary respectively.

PROFESSOR E. E. KURTH, D.Sc., head of the Chemistry Department of the University of Tasmania, Hobart, has been appointed to the newly founded Chair in Chemistry there.

MR. C. J. REGAN, B.Sc., F.I.C., has been appointed Chemist-in-Chief, London County Council, and official Agricultural Analyst in succession to MR. E. R. ANDREWS, F.I.C., who retired on August 27.

MR. JOHN CLARK, the chemist who was dismissed from a Royal Ordnance factory in the north-west after he had written an article criticising management at the works, has been given a similar position at another Royal Ordnance factory.

SIR DAVID MILNE-WATSON was installed as President of the Fuel Luncheon Club in London, on Wednesday, in succession to COL. W. A. BRISTOW. In his presidential address, Sir David gave his views on the future of fuel, stressing his strong leanings towards unified administration.

DR. R. E. WILSON, president of the Pan American Petroleum and Transport Co., and a director of the American Chemical Society, has resigned his position as oil consultant to the Office of Production Management. His successor is MR. W. G. WHITMAN, head of the Department of Chemical Engineering of the Massachusetts Institute of Technology.

ALDERMAN SIR CHARLES H. BIRD, chairman and managing director of Bird and Son, Ltd., chemical manufacturers and oil importers, Cardiff, has completed 30 years' chairmanship of Cardiff Waterworks Committee—a record believed unique in public service. His father and grandfather were Mayors of Cardiff, while Sir Charles was Lord Mayor of the City in the year 1910-11.

The following have passed the Examination for the Fellowship of the Institute of Chemistry: MR. ROY HAMMOND, B.Sc. (in organic chemistry); MR. E. G. WHITTLE, B.Sc. (in the chemistry, including microscopy, of food and drugs, and of water); and MR. W. R. HEADING, B.Sc., Ph.C. (in industrial chemistry, with special reference to sulphuric acid and fertilisers). The Institute's September pass list also includes the names of 22 new Associates, including one woman.

SGT. L. H. MORGAN, 217 Squadron, R.A.F., who has has been awarded the D.F.M., has wrought great havoc recently among enemy-occupied chemical plant. One night in September last he dropped heavy bombs and incendiaries on the tanks of the oil refinery at Donges, near St. Nazaire, starting a large and lasting fire. Two nights later he made another successful attack, this time on a chemical works at Nantes. F/O G. TAYLOR, A.F.C., of the same squadron, who has been awarded the D.F.C., participated in the attack on Donges oil refinery.

Obituary

MR. MAURICE DEACON, managing director of the Sheepbridge Coal and Iron Co., Ltd., for 25 years, until his retirement in 1924, has died at the age of 90. He was also a director of British Tar Products, Ltd., Pluckley Brick and Tile Co., Ltd., Kent, and Tinsley Park Colliery Co., Ltd., Sheffield.

New Control Orders

Export of Chemicals and Drugs

IN accordance with the Export of Goods (Control) (No. 34) Order, 1941 (*see* THE CHEMICAL AGE, October 11, p. 200), the following are the additions to the list of products, export of which to all destinations is prohibited except under licence: albumin tannate, arecoline and its preparations, balsam of Peru and tolu, benzocaine and its preparations, butyl acetate, calcium glycerophosphate and its preparations, oil of cloves, wood creosote, dicyandiamide, diethylamine, dimethylaminoethanol, divinyl ether, ethyl cyanacetate, guanidine carbonate, 8-hydroxyquinoline (oxine) and its compounds, *iso*propylbarbituric acid, *p*-chlor-*m*-xylenol and its preparations, phenacetin and its preparations, phenolphthalein and its preparations, polymerised chlorovinyl compounds, quinine ethyl carbonate, quinoline, quinolinic anhydride, salicylic acid, sulphanilamide and its derivatives and preparations, terpineol and its preparations, theobromine and its compounds and preparations, thymol, and urethane.

The export without licence of the following to certain specified destinations is prohibited: inorganic iodides, iodine, iodoform and iodoxyl, and all nickel compounds and mixtures containing any of these compounds.

Lubricating Oil Plant

Under the Machinery, Plant, and Appliances (Control) (No. 5) Order (S. R. and O. 1941, No. 1610), lubricating-oil washing machinery and plant has been added from October 13 to the schedule of goods, the supply of which is subject to licence.

British Chemical Prices

Market Reports

STRONG values continue to be the chief feature of the industrial chemicals market, and so far as new business is concerned activity is restricted only by the scarcity of immediate delivery offers. In regard to existing contract deliveries, specifications cover good volumes and the position here is regarded as satisfactory. Supplies of yellow prussiate of potash, bichromate of potash and caustic potash are on the short side and in the soda section similar conditions operate for chlorate of soda and bichromate of soda. Among the heavy acids offers of oxalic are difficult to obtain whilst both citric and tartaric acids are also in short supply. There has been no change in the quotations for lead oxides and white lead and a steady trade is reported. A firm tone is the chief characteristic of the market for coal tar products, buying during the past week being perhaps a shade less active, although producers are chiefly occupied with existing commitments. Supplies of cresylic acid and naphthalene are again below the demand whilst offers of creosote oil are finding a ready outlet.

MANCHESTER.—Business in several of the leading items in the chemical market is regulated almost entirely by the supply position, near delivery parcels being difficult to secure, and the price position is correspondingly strong. On the Manchester market during the past week business generally has been brisk from the point of view of contract deliveries, and a fair aggregate volume of new orders has been booked. The features of the by-products section have been a rise in quotations for crude carbolic, cresylic acid being also somewhat dearer. Almost all the tar products are meeting with a brisk inquiry and buyers state that it is not easy to secure early delivery lots.

GLASGOW.—There is no appreciable change in the Scottish heavy chemical trade for home business. Export inquiries are still rather limited. Prices generally keep very firm.

Price Changes

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £25.

Carbolic Acid.—MANCHESTER: Crystals, 10½d. per lb., d/d; crude, 4s. 2d. to 4s. 5d., naked at works.

Citric Acid.—1s. 5½d. per lb. MANCHESTER; 1s. 8d.

Creosote.—Home trade, 6½d. to 9d. per gal., f.o.r., maker's works; export, 6d. to 6½d. per gal, according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 99/100 per cent., 4s. 9d. per gal. MANCHESTER: 4s. 10d. per gal.

Lead Acetate.—MANCHESTER: £48 to £50 per ton.

Xylol.—Commercial, 3s. 6d. per gal.; pure, 3s. 9d. MANCHESTER: 3s. 4d. to 3s. 10d. per gal.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

Removal of silica from water.—Permutit Co., Ltd. (Permutit Co.). 10265.

Manufacture of cyclopentanopolyhydrophenanthrene ketols and esters thereof.—T. Reichstein. (Switzerland, Aug. 16, '40.) 10292. (Switzerland, May 26.) (Cognate with 10292.) 10293.

Production of laminated materials.—American Cyanamid Co. (United States, Aug. 17, '40.) 10500.

Production of laminated materials.—American Cyanamid Co. (United States, Jan. 28.) (Cognate with 10500.) 10501.

Separation of water soluble vitamins from water soluble materials.—American Dairies, Inc., and Quaker Oats Co. (United States, Aug. 17, '40.) 10433.

Separation of water soluble and fat soluble vitamins.—American Dairies, Inc., and Quaker Oats Co. (United States, Aug. 17, '40.) 10434.

Filtration of gases.—P. J. Askey, E. Harding, J. S. Hales, D. G. Skinner, and Imperial Chemical Industries, Ltd. 10613.

Anti-oxidants for organic substances.—A. Banks and J. A. Lovern. 10617.

Concentration of ores.—Bethlehem Steel Co. (United States, July 3, '40.) 10430.

Manufacture of aldehydes from alcohols.—British Industrial Solvents, Ltd., R. W. Reynolds-Davies, and E. E. Connolly. 10569.

Production of fuel gases from charcoal. Companhia de Carris, Luz, e Força do Rio de Janeiro, Ltda. (Brazil, Aug 17, '40.) 10429.

Manufacture of coated strip material.—Copeman Laboratories and H. Y. Jennings. 10466.

Treatment of nylon.—Courtaulds, Ltd., C. M. Whittaker, H. A. Thomas, and C. C. Wilcock. 10383.

Coating compositions.—C.U.R.A. Patents, Ltd., and M. Pirani. 10418.

Production of organic compounds.—H. Dreyfus. 10481, 10482.

Production of hydroxythiols.—E. I. du Pont de Nemours and Co., W. A. Lazier and F. K. Signaigo. 10609.

Process for concentrating ore materials.—H. G. C. Fairweather (American Cyanamid Co.). 10544.

Manufacture of hydrophilous hydrokeratin colloids.—I. Goldberg and J. Königsberg. 10428.

Process for obtaining a permanent union between cement surfaces and paint, etc.—G. E. Heyl. 10578.

Catalytic reaction vessel.—International Catalytic Oil Processes Corporation. (United States, Aug. 22, 40.) 10499.

Consolidation of joining surfaces of organic thermoplastic material.—W. J. Jarrard, M. R. Moritz, and H. P. Zade. 10506.

Cyclammonium quaternary salts, and derivatives thereof.—Kodak, Ltd. (United States, Aug. 21, '40.) 10451, 10452, 10453.

Welding of glass to metal.—B. Long. (France, Aug. 21, '40.) 10455. (France, Feb. 13.) (Cognate with 10455.) 10456. (France, June 28.) (Cognate with 10455.) 10457.

Manufacture of carbon papers, etc.—R. B. Matthews. 10377.

Production of amidines.—May and Baker, Ltd., H. J. Barber, and A. D. H. Self. 10545.

Manufacture of aminoalkylidene derivatives.—Roche Products, Ltd., F. Bergel and A. Cohen. 10641.

Chemical processes.—A. J. Rudge, A. J. Lowe, and Imperial Chemical Industries, Ltd. 10612.

Depolarising materials.—J. W. Smith. 10593.

Manufacture of polymeric substances. Standard Oil Development Co. (United States, Aug. 22, '40.) 10379.

Complete Specifications Open to Public Inspection

Anti-icing composition for aircraft.—L. Renault. Feb. 23, 1939. 1031/40.

Radio-active alloys, and methods of preparing the same.—Firestone Tyre and Rubber Co. Jan. 4, 1940. 6697/40.

Process of treating cellulosic fibres for papermaking, and the treated cellulosic fibres and paper produced therefrom.—G. B. Fowler. Feb. 13, 1940. (Cognate application, 9942/40.) 9941/40.

Processes of preparing esters of methacrylic acid.—British Thomson-Houston Co., Ltd. Dec. 1, 1939. 17038/40.

Manufacture of organic compounds.—E. I. du Pont de Nemours and Co. Feb. 12, 1940. 1530/41.

Condensation of carbonylic compounds.—Shell Development Co. Feb. 12, 1940. 1662/41.

Polishing of stainless iron or steel by anodic treatment.—Alloy Research Corporation. Feb. 15, 1940. 1716/41.

Synthetic resinous compositions.—British Thomson-Houston Co., Ltd. Feb. 14, 1940. 1734/41.

Amino derivative of organic acids for rubber compounding surface activation and the like.—E. A. Van Valkenburgh. Feb. 16, 1940. 1995/41.

Oil-soluble synthetic resinous compositions.—British Thomson-Houston Co., Ltd. Feb. 17, 1940. 2107/41.

Production of resinous compositions.—British Thomson-Houston Co., Ltd. Feb. 17, 1940. 2108/41.

Method of treating liquids.—Houdry Process Corporation. (Cognate applications, 2143-6/41.) Feb. 17, 1940. 2142/41.

Complete Specifications Accepted

Method of speeding up the making of pigment pastes, and product thereof.—Nuodex Products Co., Inc. Dec. 22, 1938. (Cognate application 29462/39.) 538,592.

Compounded mineral oil.—Standard Oil Co. of California. Nov. 21, 1938. 538,474.

Method of dissolving hard and difficultly soluble resins. O. Svensson. Dec. 21, 1938. 538,513.

Exothermic mixtures for use in the production of iron and iron alloys, and method of using such mixtures.—M. J. Udy. Jan. 28, 1939. 538,439.

Method of manufacturing dried starch conversion products.—J. F. Walsh and American Maize-Products Co. Jan. 6, 1940. 538,568.

Chromium metallurgy.—M. J. Udy. Feb. 15, 1939. 538,477.

Process for the manufacture of derivatives of cyclopentanophenanthrene.—F. Hoffmann-La Roche and Co. A.-G. Feb 9, 1939. 538,478.

Insecticidal compositions.—Stafford, Allen and Sons, Ltd., and T. F. West. Feb. 1, 1940. 538,523.

Dewaxing of mineral oil.—Texaco Development Corporation. Feb. 11, 1939. 538,634.

Production of esters and ether-esters.—E. I. du Pont de Nemours and Co. Feb. 2, 1939. 538,635.

Method of recovering hydroxy-3-aetiocholenic acid and its esters.—N.V. Organon. March 16, 1939. 538,487.

Extracting and concentrating sulphur dioxide.—Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny, et Cirey. Oct. 16, 1939. 538,602.

Manufacture of textile-treating agents.—E. I. du Pont de Nemours and Co., and R. W. Maxwell. Feb. 6, 1940. (Addition to 536,619.) 538,608.

Electroplating magnesium and alloys thereof.—Dow Chemical Co. March 13, 1939. 538,616.

Manufacture of polyamides.—E. I. du Pont de Nemours and Co. Feb. 7, 1939. 538,619.

Aluminium alloys.—E. A. Schmeller, J. Schmeller, sen., F. I. Schmeller and J. L. Schmeller. Feb. 4, 1939. 538,637.

Manufacture of aliphatic nitrates.—Standard Oil Development Co. March 30, 1939. 538,446.

Process for the manufacture of an azo dyestuff containing the arseno group.—E. A. H. Friedheim. April 26, 1939. 538,450.

Separation of minerals from ores.—C. E. Every (F. L. Smidth and Co. A/S.). March 13, 1940. (Addition to 516,603.) 538,451.

Process for the preparation of diamidine derivatives.—May and Baker, Ltd., A. J. Ewins, H. J. Barber, G. Newbery, J. N. Ashley and A. D. H. Self. April 5, 1940. (Addition to 507,565.) 538,463.

Artificially-cooled high-pressure mercury-vapour discharge tubes. April 14, 1939. (Addition to 484,143.) 538,533.

Apparatus for filtering and scrubbing gases.—H. W. Witney. April 12, 1940. 538,467.

Manufacture of water-soluble complex gold-peptone-saccharide compounds.—A. Schwarzmann. May 20, 1939. (Cognate application, 7532/40.) 538,498.

Process for the preparation of the double salt of calcium gluconate and calcium glucoheptonate, and solutions thereof. Organon Laboratories, Ltd. June 13, 1939. 538,548.

Manufacture of coffee substitutes.—S. Woods. July 16, 1940. 538,510.

Amended Specifications Published

Colouring treatment of anodic coatings on aluminium, etc.—Electro-Metallurgical Research Co., Ltd., and ors. 474,609.

Flocculation of solid in liquid suspensions.—F. G. Francis. 481,499.

General News——From Week to Week

The first list of donations to the Aid to Russia fund includes a gift of £2100 from I.C.I., Ltd.

A million tons of waste paper are needed by the Ministry of Supply for the making of shells and cartridge cases. Old bills, obsolete publications, and back numbers of periodicals are useful sources of this valuable salvage material.

A ten-weeks' course of training has been organised for girl metallurgical analysts at the County Technical College, Wednesbury, Staffordshire. Students are paid during training, and arrangements will be made to find them employment with local firms.

The Board of Trade announces that all applications to import lanoline, wool-grease, and degras, for whatever purpose required, should be made on the official standard application form and addressed to the Import Licensing Department, Board of Trade, 1-6 Tavistock Square, London, W.C.1.

The Food Substitutes (Control) Order, 1941 (S. R. & O. 1941, No. 1606) comes into force on October 27. By this Order the Minister of Food prohibits the manufacture of food substitutes except under licence, and permits the sale of food substitutes only in the manufacturers' container and with his label and description. On and after November 10 no food substitutes may be sold which have not been manufactured under licence.

Maximum prices for technical tallows are fixed by the Minister of Food in the Technical Tallows and Greases (Home Melt) (Maximum Prices) Order, 1941 (S. R. & O. 1941, No. 1605), which came into effect on October 13. A schedule of maximum prices ranges from 21s. to 25s. per cwt. for tallows, and from 20s. 6d. to 23s. per cwt. for greases, according to quality, with packages and delivery to buyers' premises extra.

Outlining "Vital Developments from the Dyestuffs Industry," Mr. J. Bruce, in an address to the Scottish Section of the Society of Dyers and Colourists, recently held in Glasgow, said that the purpose of his paper was to emphasise facts not widely enough known or understood. He contended that the development of the synthetic chemical industry had as its basis the needs of the dye industry, and in this connection the significance of the indigo synthesis in regard to the development of both organic and inorganic chemical industry was profound. Possibly the most important fact was that this country is largely dependent, in almost all its present-day industries, on synthetic organic products.

Foreign News

Deposits of beryllium have been located in several mines at Mount Stormont in the Middlesex district of Tasmania.

Imports of chemicals and chemical preparations into Burma in the fiscal year ended March, 1941, were valued at Rs. 32,63,000 against Rs. 29,22,000 in the previous year.

Total output of lead in the United States for the first six months of 1941 was 228,478 tons, compared with 457,392 tons in the whole of 1940. Production during June was 38,136 short tons, a decline of 3 per cent. from that of May.

Production and shipments of molybdenum in the U.S. were 3,364,900 and 2,961,700 lb. respectively, in July. The average monthly rate of production and shipments in 1940 was 2,859,400 and 2,110,800 lb. respectively.

Mineral lubricating oil is to be supplied to Turkey by Rumania, under an agreement which has just been reached. It will be transported by sea from Burgas to Istanbul, states the Istanbul correspondent of *The Times*.

In the exchange agreement which is about to be signed between Turkey and Italy for goods worth about £(T)6,000,000 (£1,200,000 sterling), Turkey will provide olive oil (among other commodities) and will receive sulphur from Italy.

Domestic mines in the United States produced 82,314 short tons of copper during June, 2 per cent. less than in May. If the June rate is maintained for the remainder of the year, there will be a total output for 1941 of 973,000 tons, an increase of 11 per cent. over 1940.

Ten pounds of sulphathiazole, for use in preventing sepsis after certain delicate surgical operations, has arrived in Cairo by air from America.

The Chilean Government has introduced a bill which proposes a tax of 0.22 pesos per kilo upon exports of copper, payable by the shippers in the currency of the country to which the copper is destined, at the official rate of exchange, or in U.S. dollars or other foreign currency. This export tax is to finance a public works plan extending over three years.

In August this year Canada exported chemicals valued at $6,464,000, compared with $3,974,000 in the same month of 1940. Imports of chemicals into Canada in July were valued at $5,938,000, and included (thousands of dollars): acids, 353; cellulose products, 247; drugs and medicines, 401; dyeing and tanning materials, 907; fertilisers, 312; paints and varnishes, 770; inorganic chemicals, 1442.

An explosion last Saturday seriously injured six men at the Permanente Corporation's magnesium factory at Palo Alto, California; this has been followed by a second explosion on Monday, when more workers were hurt. Another minor mishap of the same kind had taken place there previously. The factory, where important defence work is in hand, in the form of magnesium production by the Hansgirg process, was described in THE CHEMICAL AGE for September 20 as having been due to start operations on August 15. Although the method is not new, the Californian plant was reported to have adopted certain modifications. The vital nature of the work done, and the occurrence of the explosions so soon after the opening of the plant, give rise to grave suspicions of sabotage.

Forthcoming Events

A meeting of the **Society of Chemical Industry,** Yorkshire Section, will be held on **October 27,** at 6 p.m., in the Hotel Metropole, Leeds, when papers will be presented by R. G. Parker, B.Sc., entitled "Notes on the Properties and Selection of Refractory Material," and by E. F. Eaton, A.I.C., on "The Origin and Development of the Canning Industry."

The fourth symposium in the "Nation's Food Series" arranged by the Nutrition Panel for the Food Group of the **Society of Chemical Industry** has for its subject "Cereals as Food," and will take place at Burlington House, on **October 29** in morning and afternoon sessions. Papers will be presented by R. G. Booth, R. H. Carter, C. R. Jones, and T. Moran; A. L. Bacharach and Dr. D. W. Kent Jones; H. C. Moir; and W. P. Ford. The chair will be taken by Professor J. C. Drummond.

A meeting of the **Institute of Fuel** will be held at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, on **October 30,** at 2.30 p.m., when Mr. E. Brett Davies will present a paper entitled "Liquid Pitch Fuel." This paper will be followed by a discussion.

A joint meeting of the **Chemical Society** with the **Plastics Group of the Society of Chemical Industry,** will be held at 2.30 p.m. on **October 30,** in the Lecture Room of the Chemical Society, Burlington House, W.1., when Dr. C. A. Redfarn will read a paper entitled "The Constitution of Plastics."

A joint meeting of the **Food Group** with the South Wales Section of the **Society of Chemical Industry,** the **Institute of Chemistry,** and the **Chemical Society,** will be held in the Physics Lecture Room, University College, Cardiff, at 3.15 p.m. on **November 1,** when Dr. Magnus Pyke will deliver a lecture on "The Chemical Determinations of Vitamins."

A meeting of the **British Ceramic Society** will be held on **November 1,** at 6 p.m., in the North Staffordshire Technical College, Stoke-on-Trent, when Dr. Marcus Francis, B.Sc., F.I.C., will give a paper entitled "Pottery Research."

The Birmingham Paint, Varnish and Lacquer Club will hold its first meeting of the new season on **November 1** at the Grand Hotel, Birmingham, when Mr. Hollis, B.Sc., A.I.C., will lecture on "Some Aspects of Resin Formation."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Orders Made on Application for Discharge

LEVER, JACOB NATHAN, 6 Hanover Gardens, Broughton Park, Salford, lately carrying on business at 131 Great Ducie Street, Strangeways, Manchester (O.M.A.D. 25/10/41), chemist. Date of Order, Sept. 22, 1941. Bankrupt's discharge suspended for eighteen months to March 22, 1943.

Company Winding-Up Voluntarily

MAGIKROME, LTD. (C.W.U.V., 25/10/41). By special resolution, March 10, 1941. Frederick George Butler appointed liquidator.

Notice of Dividend

LEVER, JACOB NATHAN, chemist, lately carrying on business at 131 Great Ducie Street, Strangeways, Manchester. First and final dividend, 11s. 1d. per £, payable October 28, Official Receiver's offices, 20 Byron Street, Manchester 3.

Receiver Appointed

ASBESTOS MOLYBDENUM & TUNGSTEN CO., LTD., London, E.C. (R.A., 25/10/41). D. H. Allan, 17 St. Helens Place, Bishopsgate. September 17, by order of Court.

Company News

Timothy Whites and Taylors, Ltd., have declared an interim dividend of 7½ per cent. (same).

Lightalloys, Ltd., announce a final dividend of 12½ per cent., making 25 per cent. (same).

Greeff-Chemicals Holdings announce an interim dividend of 3 per cent. (same).

Lawes Chemical Co., Ltd., have declared a dividend of 6 per cent. (same), for the year to June 30.

The British Thermostat Co., Ltd. have declared a dividend of 7½ per cent. (same).

Cimex, Ltd., manufacturers of insecticides, etc., have increased their nominal capital beyond the registered capital of £3000, by the addition of £2000 in £1 ordinary shares.

Eastwoods Lewes Cement, Ltd., have declared a dividend of 3½ per cent. on the ordinary and founders' shares, making 7½ per cent. for the year.

Millom and Askam Hematite Iron Co., Ltd., announce a half-yearly dividend on 7 per cent. cumulative participating preference shares, payable January 1.

Steaua Romana British announce an interim dividend of 1 per cent. (2½ per cent.), to be regarded as final for the year ended June 30.

Northern Counties Laboratory, Ltd., coal research, etc., have increased their nominal capital beyond the registered capital of £6000 by the addition of £2000 in £1 ordinary shares. All the original shares have been converted into ordinary. At July 31, 1941, The Gas Light and Coke Company and Stephenson Clarke and Associated Companies, Ltd., each held 3000 shares.

The United Molasses Co., Ltd., announces an interim dividend of 7½ per cent., less tax, on the ordinary stock in respect of the year ending December 31. A similar distribution last year was followed by a final dividend of 12½ per cent. At the same time, a cash distribution (not subject to tax) of 2½ per cent. was paid out of capital reserve.

New Companies Registered

A. & F. Pears (Overseas), Ltd. (370,015).—Private company. Capital: £40,000 in 40,000 shares of £1 each. Manufacturers of and dealers in soaps, soap powders, detergents, starch, soda, water softeners, laundry materials, etc. Subscribers: S. A. Ralph; W. H. Masters. Solicitor: Leslie A. Ellwood, Unilever House, E.C.4.

Hemel Limes, Ltd. (370,073).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in lime, lime products, fertilisers, chemical and industrial preparations and articles, etc. Directors: E. Caldwell; E. Lancaster; J. Wheeler; L. Wheeler; Wm. Whitehead. Registered office: St. Stephens House, Westminster, S.W.1.

Devon and Cornwall Ochre Mining Company, Ltd. (369,857).—Private company. Capital: £1000 in 1000 shares of £1 each. To prospect for, mine, quarry or otherwise obtain ochre, ores, asbestos, etc., to treat same by any means or process, to obtain and prepare for market ochre, etc. Subscribers: Alice Marriner; W. F. Mickle; A. H. Edwards. Solicitors: Chilcott & Pearce, Tavistock, Devon.

Vinolia Co. (Overseas), Ltd. (370,033).—Private company. Capital: £2000 in 2000 shares of £1 each. Objects and other particulars are similar to those in A. & F. Pears (Overseas), Ltd. *(see above)*.

Starch Distributors, Ltd. (369,955).—Company limited by guarantee without share capital. Original number of members not to exceed 20, each member liable for £5 in the event of winding up. Distributors of starches and other farinaceous products on behalf of the Ministry of Food. Permanent directors: H. P. Maskell; Henry J. Hall. Solicitor: Herbert Smith, Cereal House, Mark Lane, E.C.3.

Chemical and Allied Stocks and Shares

FIRMER and slightly more active conditions have been in evidence in most sections of the Stock Exchange, where sentiment, although dominated by a disposition to await developments in the war and international affairs, was assisted by the continued absence of selling. In fact, the slightly lower prices ruling earlier in the week tended to attract attention, and in numerous directions securities have recorded small gains at the time of writing. Owing to the firmness with which all classes of stocks and shares are held, they tend to respond strongly in price on only moderate improvement in demand. Moreover, although fluctuations must be expected in accordance with the nature of the war news, the prevailing belief is that, during the next few months, the upward trend in British Funds is likely to make further progress, and that this would have a beneficial influence on the stock and share markets generally.

Following a decline to 32s., Imperial Chemical moved better to 32s. 6d., and were slightly higher on balance, but the 7 per cent. preference units at 33s. 3d., were below the price current a week ago. Lever and Unilever regained an earlier decline and at 26s. 3d. were maintained on balance, while Borax Consolidated were steady at 28s. 9d. The market is hopeful that the dividend of the last-named may be kept at 7½ per cent., the assumption being that the company's business in the U.S.A. may have offset any falling-off in other markets. B. Laporte remained firmly held and were again quoted at 62s. 6d., but were inactive, while Fison Packard at 35s. were also unchanged. There was, however, a reactionary tendency in British Match, which moved down 6d. to 34s., and in other directions, Associated Cement were 50s. Elsewhere, Lawes Chemical ordinary shares were again quoted at 7s. 6d., following the announcement of the maintenance of the dividend at 6 per cent., and British Glues 4s. shares, which remained firmly held, continued to be quoted around 6s., moreover, Greeff-Chemicals Holdings 5s. shares were unchanged at 5s. 7½d., as were Monsanto Chemicals 5½ per cent. preference at 22s. 6d. There was increased activity in British Celanese issues, there being hopes that the results, due in a few weeks, may show improved earnings; the second preference rose 9d. to 13s. 9d. and the ordinary shares were better at 4s. 10½d. At the time of writing, Courtaulds have also reflected the firmer conditions on the Stock Exchange, and have improved a few pence to 32s.

Among other securities, Imperial Smelting were steady at 12s. 3d., awaiting the dividend decision, and General Refractories were quoted at 10s. On further consideration of the improved results, Low Temperature Carbonisation 2s. shares have made the better price of 1s. 5d. On the other hand, Wall Paper Manufacturers deferred units were affected by the cautious remarks in the annual report, and moved back to 24s. 6d. Continued market expectations that the dividend is likely to be maintained have kept a firm undertone in Tube Investments shares, which were 92s. 6d., while Stewarts and Lloyds were better at 46s. 9d. Some attention was given to Richard Thomas 6½ per cent. preference at 16s. 6d.

Firmness was shown in British Plaster Board at 17s., and by Barry and Staines at 37s. 3d., while Nairn and Greenwich were again 61s. 3d. United Molasses have been active around 27s. aided by the market view that there seem reasonable possibilities of the dividend rate being maintained. Erinoid 5s. shares, which remained under the influence of the improved dividend, were again firm at par; British Industrial Plastics were 3s. 3d., and Lacrinoid Products 2s. shares transferred around 1s. 10½d. There was rather more attention given to Benzol and By-Products preference dealings which ranged from 17s. 6d. to 18s. 4½d. Ilford ordinary shares have been more active around 29s. 6d. awaiting the results, due in December. Elsewhere, Boots Drug were firm at 35s., as were Sangers at 17s., but Timothy Whites became easier at 21s. 4½d. "Shell" and other oil shares have reflected the better tendency ruling on the Stock Exchange at the time of writing.